



## Receiver Autonomous Integrity Monitoring (RAIM)

### Benefits and Features

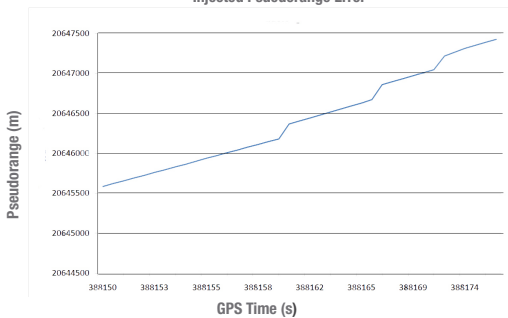
Improved GNSS system integrity

Improved position solution

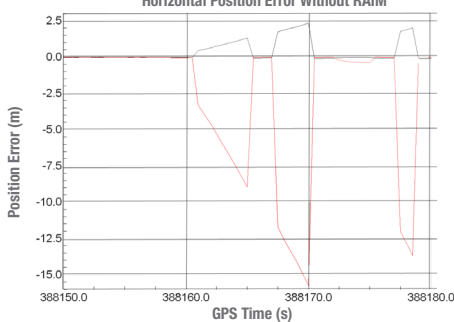
User alerts when RAIM is not available

NovAtel's RAIM algorithm provides receiver autonomous integrity monitoring for broadcast GNSS signals. Developed based on RTCA DO-229D (2006), the primary purpose of RAIM is for aviation navigation systems requiring signal and position integrity during various stages of flight. RAIM employs Fault Detection and Exclusion (FDE) which uses redundant pseudorange measurements to detect and exclude faulty signals that may cause positioning instability. The position solution is recomputed to ensure continuous operation in the presence of a GNSS failure. The use of NovAtel RAIM functionality is not restricted to aviation applications, as users can customize parameters to meet the requirements of their specific application requiring continuous operational confirmation.

**Figure 1: Injected Pseudorange Error**  
Injected Pseudorange Error

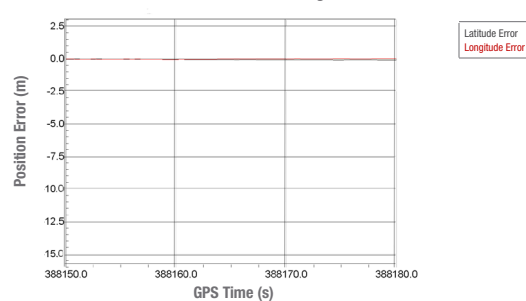


**Figure 2: Positioning Error Without RAIM**  
Horizontal Position Error Without RAIM



The benefits of RAIM are apparent when individual satellites experience pseudorange measurement errors that typically cause significant positioning error. Figure 1 shows induced pseudorange errors to satellite measurements over time using a GNSS Simulator. Figure 2 shows the corresponding horizontal positioning error when no integrity monitoring is applied to the satellite measurements. Figure 3 shows the optimized positioning error when RAIM is used. In this case the RAIM algorithm is able to detect the pseudorange anomaly and eliminate it from the position solution. The receiver is then able to recalculate the position with the bad pseudorange removed, and produce a position with far less error.

**Figure 3: Positioning Error With RAIM**  
Horizontal Position Error With RAIM Using Pfa=10%



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Version 1 - D16126 Specifications subject to change without notice.

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Printed in Canada.

April 2011

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